

REMARKS

Claims 1-15, 20-51 and 60-67 are now pending in the application. The amendments to the claims contained herein are of equivalent scope as originally filed and, thus, are not a narrowing amendment. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 102

Claims 24-28, 32, 33, 35, 36, 38-40, 44, 46-48, 60 and 62-64 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kimura et al. ("Very Quick Audi-Searching: Introducing Global Pruning to the Time-Series Active Search," Proc. Of International Conference on Acoustics, Speech and Signal Processing) (ICASSP2002), Vol. 3, pp. 1429-1432, Salt Lake City, Utah, USA, May 2001.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-15, 20-23, 41-43, 49-51 and 65-67 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kashino et al. ("A Quick search Algorithm for Acoustic Signals Using Histogram Features – Time Series Active Search," Institute of Electronics Information and Communication Engineers of Japan, Vol. J82-D, No. 9, pp. 1365-1373, September 1999, with citations from the English translation) in view of Applicant's Admitted Prior Art. Examiner's rejections under sections 102 and 103 are respectfully traversed.

Claims 1, 12 and 20

- (a) The created sub-signal selection step recited in Claim 1 has been amended based on, for example, FIG. 7 and page 53, line 1 to page 56, line 7 of the specification in which segmentation boundaries, where the dimensionality of a compressed signal changes, are determined as candidates for the most suitable segmentation boundary. The created sub-signal selection section recited in Claim 12 and the created sub-signal selection step recited in Claim 20 have been amended in the same manner as Claim 1.
- (b) The compression mapping determination step recited in Claim 1 has been amended based on, for example, FIG. 11 and page 59, lines 13-21 of the specification in which a compression mapping determination section 4 reads in a set of segments output from a sub-signal re-creation section 3, and determines mappings through the processes in steps S56 and S58 using these segments. The compression mapping determination section recited in Claim 12 and the compression mapping determination step recited in Claim 20 have been amended in the same manner as Claim 1.
- (c) The preambles of Claims 1, 12 and 20 have been amended based on, for example, page 50, lines 2-6 of the specification. Claim 8 has been amended to as to conform to the recitation of amended Claim 1.
- (d) The compression mapping determination step and the signal compression step recited in Claim 1 have been amended based on, for example, page

59, lines 13-21 of the specification. The compression mapping determination section and the signal compression section recited in Claim 12 and the compression mapping determination step and the signal compression step recited in Claim 20 have been amended in the same manner as Claim 1. Claims 2, 9, 13 and 21 have been amended so as to conform to the recitations of amended Claims 1, 12 and 20.

- (e) The signal compression step recited in Claim 1 has also been amended based on, for example, page 51, lines 7-20, page 52, lines 15-16, page 53, line 5, page 56, line 22, page 57, lines 15-22, and page 59, lines 7-9 of the specification. The “unit time” corresponds to the “frame” in the embodiments of the present application, and “each of the multi-dimensional vectors in each unit time” corresponds to the “histogram” in the embodiments. One histogram is generated per one frame. That is, as can be understood from the foregoing portions of the specification, a segment is identical to a sub-signal, the sub-signal (segment) includes histograms, and the length of a segment (sub-signal) is equal to the number of frames. Moreover, a compression histogram is generated so as to correspond to a histogram within each sub-signal, and then a compression feature is generated as a compression signal so as to correspond to the compression histogram, thereby reducing the dimensionality of the histogram. The signal compression section recited in Claim 12 and the signal compression step recited in Claim 20 have been amended in the same manner as Claim 1.

Claims 24, 44 and 60

The database feature partitioning step recited in Claim 24 has been amended based on, for example, FIG. 38 and page 82, lines 4 to page 83, line 7 of the specification in which a database feature partitioning section 103 partitions a histogram sequence by equally segmenting the histogram sequence to create partial histogram sequences, each having a length of, for example, 50 frames. The database feature partitioning section recited in Claim 44 and the database feature partitioning step recited in Claim 60 have been amended in the same manner as Claim 24.

Independent Claims 1, 12, and 20

The Examiner merely enumerates the names of the sections of Kashino, that is, a "section 2.1", a section "2.2 - Feature extraction", a section "2.3 - Feature modeling by means of histograms", and a section "3.1.2 - Vector quantization" with respect to Claim 1. The Examiner points out no specific recitations of Kashino with respect to these claims.

However, it appears to the applicants that the Examiner constructs the reasons for rejection by improperly connecting the phrase "sub-signal" recited in the respective steps of Claim 1 with various different technical concepts in Kashino on a case-by-case basis, rather than connecting the phrase "sub-signal" recited in the respective steps of Claim 1 with the single technical concept in Kashino. According to the applicants' analysis, Kashino discloses four technical concepts which the Examiner may read as the phrase "sub-signal".

1) A signal (hereinafter referred to as "a feature division signal") in a time division (hereinafter referred to as "a feature division") used for the calculation of a feature vector or a feature vector extracted from the feature division signal.

The feature division is a unit for the extraction of features vectors which are extracted prior to producing histograms.

Assuming that the feature division signal (or the feature vector) of Kashino corresponds to the claimed sub-signal, if Kashino discloses the created sub-signal selection step recited in Claim 1, Kashino should prune candidates of a feature division signal which are created for an initial feature division signal by selecting candidates of a feature division signal which provides a higher possibility of reducing a larger amount of data of a compressed signal than the other candidates of a feature division signal. However, Kashino does not disclose such a technical idea.

Moreover, assuming that the feature division signal (or the feature vector) of Kashino corresponds to the claimed sub-signal, if Kashino discloses the sub-signal re-creation step recited in Claim 1, Kashino should determine a feature division signal which is actually to be used, using the candidates of the feature division signal. However, Kashino does not disclose such a technical idea.

2) A signal in a time window or a feature vector extracted from the signal.

The time window is a unit used for comparing a reference signal and an input signal.

Kashino clearly states that the time window has the same length as the reference signal (page 41, right column, third paragraph, lines 3-4). Assuming that the signal in

the time window (or the feature vector) of Kashino corresponds to the claimed sub-signal, if Kashino discloses the created sub-signal selection step recited in Claim 1, Kashino should prune candidates of a signal in a time window having different lengths. However, since the signals in the time window have the same length as the reference signal, all these signals have the same length. Therefore, it is apparent that Kashino does not prune candidates of a signal in a time window having different lengths.

The Examiner may connect the created sub-signal selection step recited in Claim 1 with a time-window skipping process of Kashino and connect the sub-signal re-creation step recited in Claim 1 with a process in Kashino which actually uses a time window which has been shifted by a skip width. Assuming these connections, if Kashino discloses the compression mapping determination step recited in Claim 1, Kashino should determine a mapping for calculation of a compressed signal from only a signal in the actually used time window which has been shifted by the skip width. However, Kashino does not disclose such a technical idea.

For example, the Examiner points out the sections 2.3 and 3.1.2 of Kashino with respect to the compression mapping determination step recited in Claim 1. However, these sections merely disclose the use of a histogram for feature modeling, the estimation of relations between signals through comparison of histograms, the use of a Euclidean distance or an overlap rate as measures for histogram similarity, and the classification of feature vectors using vector quantization when producing the histograms. Thus, those sections do not disclose the technical idea of determining a mapping for calculation of a compressed signal from only the respective sub-signals.

3) A signal in a time window (hereinafter referred to as "a divided window") divided in a time domain, or a feature vector extracted from the signal, or a histogram generated from the feature vector.

The divided window is a unit used for producing histograms. As shown in FIG. 1 of Kashino, the divided window is different from a unit for comparing an input signal and a reference signal.

Kashino discloses the technical idea of dividing a time window. However, assuming that the signal in the divided window (or the feature vector or the histogram) corresponds to the claimed sub-signal, if Kashino discloses the created sub-signal selection step recited in Claim 1, Kashino should prune candidates of a signal in a divided window by selecting candidates of a signal in a divided window which provides a higher possibility of reducing a larger amount of data of a compressed signal than the other candidates of a signal in a divided window. However, Kashino does not disclose such a technical idea.

4) The width of a bin (hereinafter referred to as "a quantization bin") of each dimension of a feature vector used in the quantization of the feature vector.

In vector quantization for producing a histogram, scalar quantization is performed for each dimension of a feature vector. The width of the quantization bin corresponds to the width of spans in the scalar quantization.

However, the width of the quantization bin is a mere width, and thus it is not possible to read such a width as a signal. In addition, the technical concept of "a signal in the width of a quantization bin" does not exist in the art.

With respect to the signal compression step recited in Claim 1, the Examiner points out the section 2.3 and 3.1.2 of Kashino in the same manner as the compression mapping determination step. However, these sections merely disclose the matters as set forth above, and thus they do not disclose the technical idea of calculating a compressed signal which corresponds to each of the sub-signals based upon the mapping.

With regard to the APA, the Examiner asserts that the APA “describes . . . signal retrieval methods which vary the lengths of the segments according to properties of the signal” (i.e., the recitation on page 2, lines 4-11 of the specification of the present application). However, there are essential differences between Claim 1 and the documents cited in the APA (i.e., Non-Patent Reference #1 entitled “Locally adaptive dimensionality reduction for indexing large time series databases” and Non-Patent Reference #2 entitled “Supporting content-based searches on time series via approximation”).

Signals to be divided into sub-signals of Claim 1 are different from those of the APA. Specifically, the APA handles one-dimensional time-series signals represented by waveforms. Such signals have only a single value in each unit time. In contrast, Claim 1 handles an original signal which is represented as a sequence of multi-dimensional vectors. Such an original signal has a plurality of values in each unit time. Moreover, it is difficult for a person having ordinary skill in the art to develop the APA so as to be able to handle signals represented as a sequence of multi-dimensional vectors.

Moreover, Claim 1 calculates a compressed signal to reduce the dimensionality of each of multi-dimensional vectors in each unit time. In the contrast, the APA merely reduces the length of a signal corresponding to the claimed sub-signal. Please note that Claim 1 handles the original signal represented as a sequence of multi-dimensional vectors as explained above, and thus a sub-signal has values the number of which is equal to a product of the length of the sub-signal (i.e., the number of unit times) and the number of dimensionality in each time unit. In contrast, the APA handles a one-dimensional time-series signal as explained above, and thus a signal corresponding to the claimed sub-signal has values the number of which is equal to the length of this signal.

Furthermore, the APA merely employs the technique of approximating waveforms using rectangles. The APA uses the same mapping in order to compress signals corresponding to the claimed sub-signals (i.e., a single mapping is used as a representative mapping). In contrast, Claim 1 uses different mappings corresponding to respective sub-signals in order to calculate a compressed signal.

As discussed above, neither Kashino nor the APA disclose the respective steps recited in Claim 1. Moreover, in accordance with the invention as recited in Claim 1, while avoiding a colossal amount of pre-processing labor, the original signal provided in advance is further compressed than in the conventional techniques, and the signal sequences can be represented with a smaller amount of information than heretofore (page 16, second paragraph of the specification). Such an advantageous effect cannot be obtained from Kashino, the APA, and a combination thereof.

Claims 12 and 20 include features similar to the feature of Claim 1. With respect to Claims 12 and 20, the Examiner provides no specific reasons for rejection (see page 7, third paragraph of the Office Action). Therefore, the foregoing arguments based on the recitation of Claim 1 can apply to Claims 12 and 20.

Independent Claims 24, 44, and 60

With respect to Claim 24, the Examiner merely asserts that "Kimura discloses a method for quick searching through a long audio stream (a stored signal) to detect and locate a known audio signal (reference signal or query) based on signal similarity" and enumerates the names of the sections 2-4 of Kimura without specifically pointing out the recitations of Kimura. It should be noted that "section 2.2-feature extraction" pointed out by the Examiner (item 8 on page 8, line 4 of the Office Action) is not found in Kimura.

Kimura merely discloses a Time Series Active Search (TAS) in the same manner as Kashino and reduction of features using a global pruning. The TAS is merely the technique as explained with respect to Claims 1, 12, and 20. Moreover, as explained on page 48, lines 12-13 of the response filed on January 2, 2008, the global pruning is a technique as summarized in dependent Claim 33 of the present application. Comparing the recitation of Claims 24 with the recitation of Kimura (or the recitation of dependent Claim 33 of the present application), it is apparent that the global pruning is different from the invention as recited in Claim 24.

For example, there is a distinct difference between the invention as recited in Claim 24 and Kimura. In the invention as recited in Claim 24, the database feature partitioning step partitions a feature sequence in a time domain, and the database feature pruning

step extracts a representative feature from each of the partitioned feature sequences. In contrast, Kimura does not disclose such features of the database feature partitioning step and the database feature pruning step. In Kimura, there is no technical idea of taking the continuity of features in a time domain into consideration when extracting representative features.

Moreover, Kimura does not disclose the feature region extraction step recited in Claim 24 which produces a region in which a feature included in the partition produced by the database feature partitioning step is present and a distance compensation step recited in Claim 24 which compensates the distance calculated by the feature matching step using the region produced by the feature region extraction step.

Claims 44 and 60 include features similar to the feature of Claim 24. With respect to Claims 44 and 60, the Examiner provides no specific reasons for rejection (see page 13, second paragraph of the Office Action). Therefore, the foregoing arguments based on the recitation of Claim 24 can apply to Claims 44 and 60.

Dependent Claims

The rejected dependent claims and the objected dependent claims should be allowed at least by virtue of their dependency on the independent claims.

ALLOWABLE SUBJECT MATTER

The Examiner states that claims 29-31, 34, 37, 45 and 61 would be allowable if rewritten in independent form. Claims 41-43, 49-51, and 65-67 stand rejected under 35

U.S.C. 103(a) (Item 4 on page 2, line 1 of the Office Action). However, the Examiner provides no specific reasons for rejection with respect to these claims. Moreover, the Examiner admits that these claims are allowable (item 5 in "Disposition of Claims" on page 1 and item 10 on page 13 of the Office Action).

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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